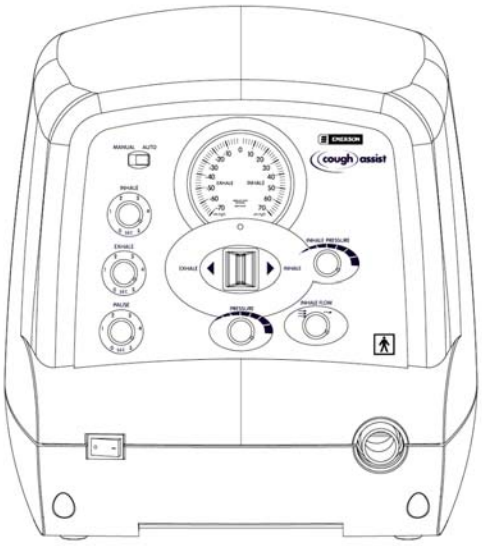
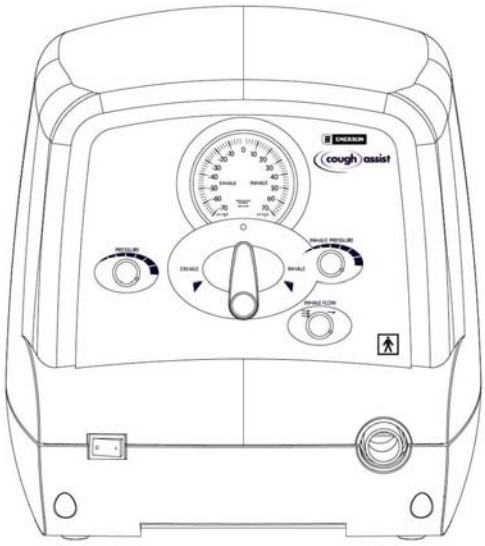
COUGHASSIST

SERVICE GUIDE



Models CA-3000, CA-3200



Models CM-3000, CM-3200

TABLE OF CONTENTS

FRONT PANEL ASSEMBLY REMOVAL 3

CIRCUIT BOARD REPLACEMENT 4

PRESSURE GAUGE REPLACEMENT 5

PADDLE SWITCH ASSEMBLY REPLACEMENT (CA MODELS ONLY) 5

FRONT PANEL LABEL REPLACEMENT 6

VALVE ASSEMBLY REPLACEMENT 6

VALVE ACTUATOR MOTOR REPLACEMENT (CA MODELS ONLY) 7

MOTOR BLOWER REPLACEMENT 8

PROPER GROUND WIRE ASSEMBLY 9

FINAL TEST PROCEDURE 10

COUGHASSIST SCHEMATICS MODELS CA-3000, CA-3200 12

COUGHASSIST SCHEMATICS MODELS CM-3000, CM-3200 14

This Service Guide is for use only by qualified technical personnel.

WARNING - Always unplug the CoughAssist from any electrical power before servicing.

FRONT PANEL PARTS REPLACEMENT - Including Front Panel, Circuit Board, Pressure Gauge, Paddle Switch (CA models only), and Front Label

The only front panel parts that may be replaced without removing the Top Cover are the six control knobs (three on the CM models), and the Manual Control Lever on the CM models only. Each control knob is held in place by one setscrew. The Manual Control Lever (CM models only) may be carefully pried off of the valve shaft, as it is held in place by an interference friction fit only.

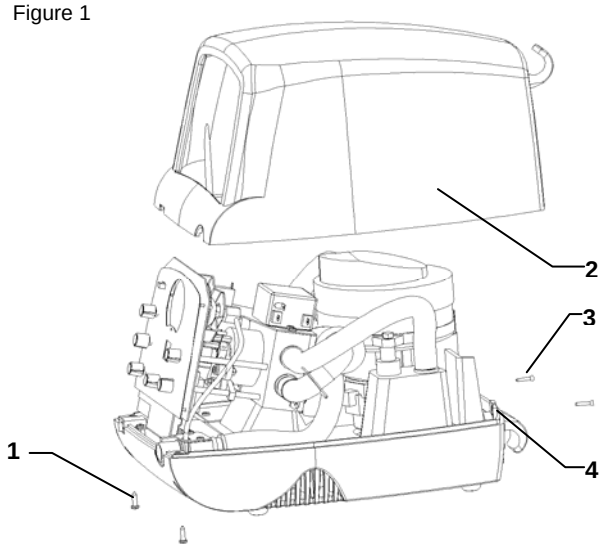
In addition, the Pressure Gauge may be "zeroed" without removing the Top Cover. The access hole directly below the gauge is covered by an adhesive sticker, which may be removed. Zero the gauge, with the unit turned off, using a small straight blade screwdriver. NOTE: If the gauge cannot be set to "0", it should be replaced.

Access to all other parts on the front panel require removal of the Front Panel Assembly as follows:

Front Panel Assembly Removal

1. Remove the two flat head screws from the rear of the housing and the two pan head screws from under the front of the housing. See Figure 1.

Figure 1



Item	Part No.	Description
1	811-3110	SCREW, PAN HEAD 8-32x5/8 (2 EACH)
2	325-9204	HOUSING TOP ASSEMBLY
3	813-3110	SCREW, FLAT HEAD 8-32x5/8" (2 EACH)
4	849-3600	TINNERMAN NUT #8 (2 EACH)

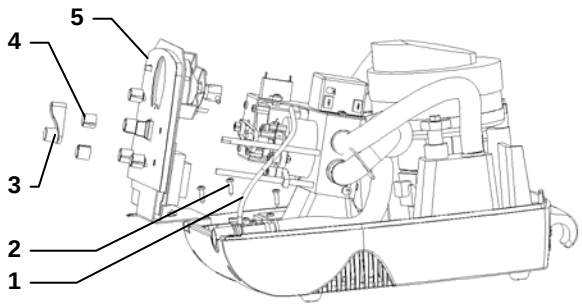
2. Lift the Top Cover off of the housing.

3. Remove the two control knobs labeled "Inhale Flow" and "Inhale Pressure" on the front panel by loosening the setscrew on each.

4. On the CM models only, remove the Manual Control Lever by carefully prying it off of the valve shaft.

5. Unscrew the three "plastite" screws holding the panel assembly to the lower housing. See Figure 2. NOTE: A long Phillips screwdriver is very helpful for access to the three screws.

Figure 2



Item	Part No.	Description
1	226-7001	PLASTIC TUBE, 1/8"ID x 8"
2	829-3108	SCREW, PLASTITE #8X1/2" (3 EACH)
3	325-0252	KNOB, MANUAL (CM only)
4	632-3004	KNOB (2 EACH)
5	325-9202	FRONT PANEL ASSEMBLY FOR CA-3000
	325-9222	FRONT PANEL ASSEMBLY FOR CM-3000
	325-9226	FRONT PANEL ASSEMBLY FOR CA-3200
	325-9227	FRONT PANEL ASSEMBLY FOR CM-3200

6. Slide the panel assembly towards the front, as shown in Figure 2.

7. To completely disconnect the panel from the unit, unplug the three white circuit board connectors (a 6-pin, a 3-pin, and a 2-pin connector), and disconnect the gauge tube from the Pressure Gauge fitting. Also, to remove the ground wire on the panel, remove the hex nut holding it on the ground stud on the panel bracket.

WARNING – If the ground wire is removed during servicing, be sure to replace it properly upon reassembly (see "Proper Ground Wire Assembly"). Failure to do so could result in an electrical shock hazard.

CIRCUIT BOARD REPLACEMENT

1. To gain access to the Circuit Board, first remove the Top Cover and Front Panel Assembly as described above.

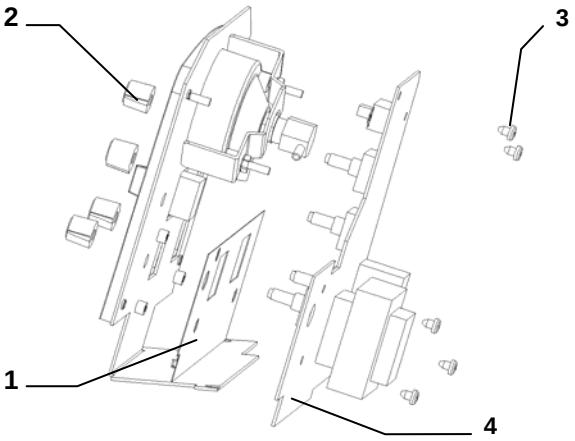
2. Remove the four control knobs (only one on the CM models) by loosening the set screw on each.

3. On the CA models only, unplug the small black circuit board connector next to the Pressure Gauge.

4. Remove the 5 nylon screws holding the Circuit Board to the panel assembly, and slide the board out.

5. To install a new circuit board, first be sure the insulator is resting on the standoffs, as shown in Figure 3, "Circuit Board Removal". Slide the board up to the panel, reinstall the five nylon screws, and reconnect the small black connector next to the Pressure Gauge (CA models only). Also, reinstall the four control knobs so that the pointers point from 0 to 5 seconds.

Figure 3



Item	Part No.	Description
1	325-0252	INSULATOR FOR CIRCUIT BOARD
2	632-3004	KNOB (4 EACH)
3	805-3604	SCREW, PAN HEAD, NYLON, 8X32-1/4" (5 EACH)
4	325-9206	CIRCUIT BOARD ASSEMBLY FOR CA-3000
	325-9223	CIRCUIT BOARD ASSEMBLY FOR CM-3000
	325-9224	CIRCUIT BOARD ASSEMBLY\ FOR CA-3200
	325-9225	CIRCUIT BOARD ASSEMBLY FOR CM-3200

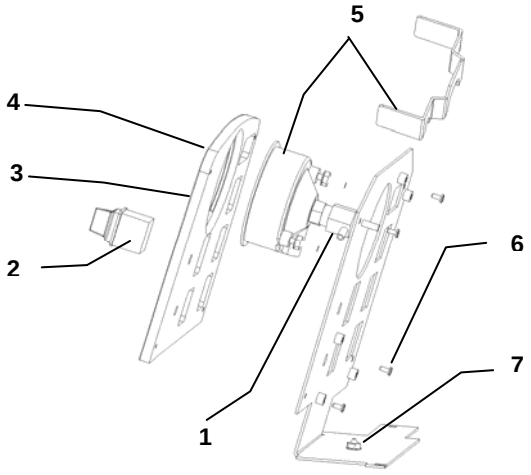
6. Whenever a new circuit board is installed, the unit must be readjusted for pressure range, as described in "Final Test Procedure".

PRESSURE GAUGE REPLACEMENT

1. To replace the Pressure Gauge, first remove the Top Cover, Front Panel Assembly and Circuit Board, as described above.

2. Remove the four 4-40 screws holding the Front Panel Spacer to the bracket, as shown in Figure 4.

Figure 4



Item	Part No.	Description
1	510-0106	BARBED ELBOW, 1/4FPT X 1/8"
2	325-9212	PADDLE SWITCH ASSEMBLY
3	901-8003	LABEL – COVER GAUGE ADJUST HOLE
4	325-9228	FRONT PANEL SPACER WITH LABEL FOR CA
	325-9229	FRONT PANEL SPACER WITH LABEL FOR CM
5	501-1011	PRESSURE GAUGE WITH BRACKET
6	811-0104	SCREW, PAN HEAD, 4-40 X 1/4" (4 EACH)
7	325-0204	FRONT PANEL SUPPORT BRACKET

3. Loosen the two hex nuts holding the gauge bracket, slide the gauge bracket aside, and remove the gauge from the front panel bracket. NOTE: On CA models only, take note of how the Paddle Switch Assembly wires are routed around the Pressure Gauge so they can be placed properly when the gauge is replaced.

4. To install a new gauge, first remove the clear plastic lens from the new gauge by unscrewing it from the gauge case. Position the gauge in the front panel bracket and install the gauge bracket, tightening the two hex nuts. NOTE: Do NOT over tighten the gauge bracket nuts. Doing so can warp the front panel bracket.

5. Replace the Front Panel Spacer and Circuit Board Assembly.

6. On CA models only, reroute the Paddle Switch Assembly wires between the gauge and gauge bracket near the bottom of the gauge, and then around and over the top of the gauge. Reconnect the switch assembly wires to the small black connector on the circuit board next to the pressure gauge.

PADDLE SWITCH ASSEMBLY REPLACEMENT (CA MODELS ONLY)

1. To replace the Paddle Switch Assembly, first remove the Top Cover and Front Panel Assembly, as described above. It is not necessary to remove the Circuit Board Assembly.

2. Unplug the small black connector on the circuit board next to the pressure gauge. Slide the wires out from the gauge bracket. Press the switch out of the panel spacer from behind.

3. To install a new switch, slide the wires through the hole in the panel from the front and press the switch in place. Be sure to orient the switch with the wires on the top row of switch contacts.

4. Route the switch wires between the gauge and gauge bracket near the bottom of the gauge, and around the top of the gauge. Reconnect the small black connector to the circuit board near the pressure gauge.

5. Check that the wires on the switch assembly do not extend beyond the ends of the switch contacts, but lead directly up towards the gauge. This is necessary to ensure that the wires do not interfere with the valve assembly.

FRONT PANEL LABEL REPLACEMENT

1. To replace the Front Panel Label and spacer, first remove the Top Cover, Front Panel Assembly and Circuit Board, as described above.

2. Remove the four 4-40 screws holding the Front Panel Spacer to the bracket, as shown in Figure 4. Replace with a new spacer with label.

VALVE ASSEMBLY REPLACEMENT

1. To remove and/or replace a valve assembly, first remove the Top Cover and Front Panel Assembly as described above.

2. Disconnect the three hoses attached to the sides of the valve (two on the left and one on the right). Also, slide the black plastic elbow off of the lower right fitting on the valve. NOTE: The connector on the valve is fragile: be careful when removing the black plastic elbow not to exert too much side pressure.

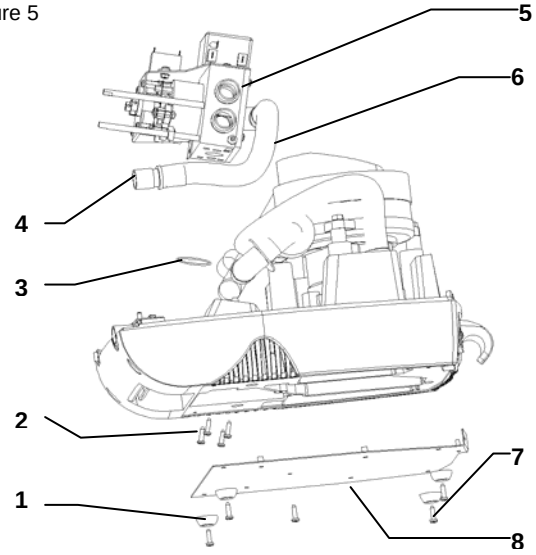
3. Disconnect the hose adapter from the patient outlet on the right side of the unit.

4. Disconnect the four push-on electrical connectors attached to the power filter on top of the Valve Assembly.

5. Turn the unit on its side and unscrew the four rubber bumpers attached to the Bottom Panel, as shown in Figure 5, "Valve Assembly Removal". Also, remove the "plastite" screw in the middle of the Bottom Panel. Remove the Bottom Panel, leaving the two green/yellow ground wires attached.

6. Unscrew the four "plastite" screws holding the Valve Assembly, as shown in Figure 5, and carefully remove the Valve Assembly from the lower housing.

Figure 5



Item	Part No.	Description
1	633-3011	RUBBER BUMPER (4 EACH)
2	829-3112	SCREW, PLASTITE #8x3/4" (4 EACH)
3	730-2028	O-RING (2-028)
4	740-1008	ADAPTER, 22mm x 22mm
5	325-9210	VALVE ASSEMBLY, CA
	325-9211	VALVE ASSEMBLY, CM
6	223-1009	FLEX TUBE, 9"
7	829-3108	SCREW, PLASTITE #8 x1/2" (5 EACH)
8	325-0238	BOTTOM PANEL

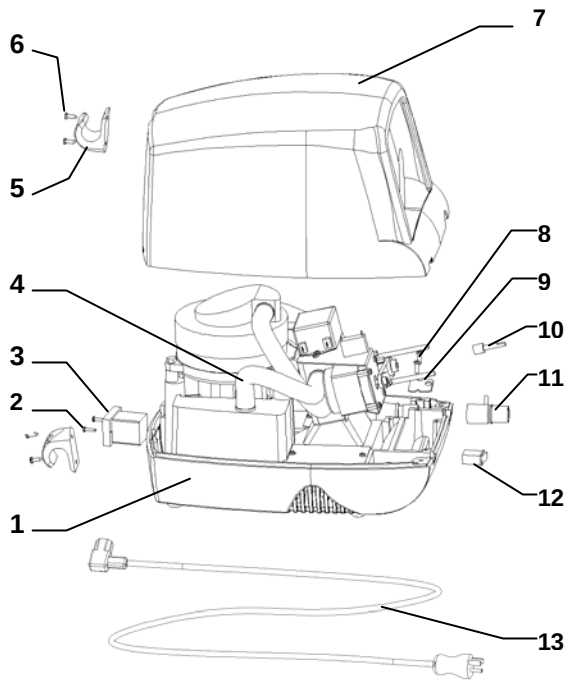
TO REINSTALL A VALVE ASSEMBLY

7. First be sure the o-ring is seated in the groove in the lower housing under the valve. Position the valve so the two large holes in the bottom of the valve body align with the two locating bosses on the housing. Reinstall the four "plastite" screws to attach the valve to the lower housing. NOTE: Be sure to use the longer, ¾" "plastite" screws to mount the valve, not the ½" screws used on the Front Panel Assembly and the Bottom Panel.

8. Replace the bottom panel using the four rubber bumpers with screws, plus one screw in the middle of the panel.

9. Reconnect the hoses and black plastic elbow to the valve assembly, as shown in Figures 2 and 6. Also, reconnect the adapter leading to the patient outlet.

Figure 6



Item	Part No.	Description
1	325-9203	BOTTOM HOUSING ASSEMBLY
2	829-2110	SCREW, PLASTITE #6 5/8" (2 EACH)
3	325-9218	MAIN POWER WIRING HARNESS WITH POWER INLET
	621-2004	FUSE, 3 AMP (2 EACH)
	628-1110	FUSE HOLDER (2 EACH)
	628-1109	POWER ENTRY MODULE
4	223-1009	FLEX TUBE, 9" (4 EACH)
5	325-0231	CORD WRAP (2 EACH)
6	829-3708	SCREW, PLASTITE (BLACK) #8 x 1/2" (4 EACH)
7	325-0201	TOP HOUSING
8	829-3108	SCREW, PLASTITE #8 x 1/2" (2 EACH)
9	325-0242	PATIENT OUTLET CLAMP
10	325-0246	MANUAL KNOB AXLE (CM only)
11	325-0255	PATIENT OUTLET
12	325-9219	WIRING HARNESS WITH POWER SWITCH
	685-9015	POWER SWITCH
13	696-4002	POWER CORD WITH HOSPITAL GRADE PLUG
	696-4003	POWER CORD WITH SCHUKO PLUG

10. Reconnect the power switch wiring harness wires to the terminals on the left side of the power filter, black wire to the rear and white wire to the front. Also, reconnect the main power wiring harness wires to the insulated terminals on the right side of the power filter, black wire to the rear and white wire to the front. NOTE: Do NOT connect any wire to the unshielded terminal on the power filter.

VALVE ACTUATOR MOTOR REPLACEMENT (CA MODELS ONLY)

On the automatic CA models only, the valve actuator motor and associated drive components may be removed and/or replaced without removing the valve from the bottom housing. To replace the valve assembly, however, it must be removed, as described in the section, "Valve Assembly Replacement". Since the valve is a precision mechanism with close tolerances, it is recommended that it not be disassembled.

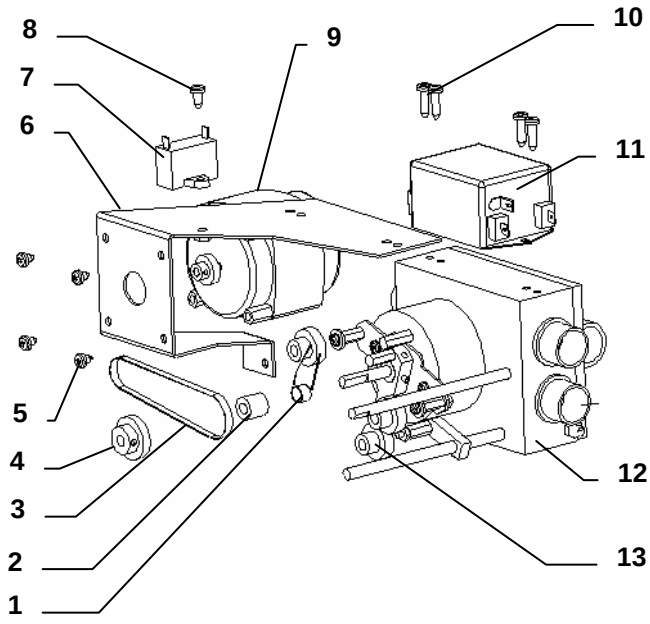
1. To replace the actuator motor or drive components, first remove the Top Cover and Front Panel assemblies as described above.

2. Remove the Power Filter from the top of the valve by removing the two "plastite" screws, as shown in Figure 7. Also, remove the screws holding the bracket to the valve, two on top and one under the actuator motor. Remove the bracket with actuator motor. Note: the cable chain will also be loose from the assembly at this time.

3. Replace other drive components as necessary: cable chain, large sprocket, spacer or torsion spring. NOTE: The small sprocket on the motor shaft is held in place using a set screw and an anaerobic adhesive, and is not designed to be removed from the shaft.

4. To remove the actuator motor, first disconnect the two terminals from the motor capacitor. Then, remove the four binding head screws holding the motor to the bracket, and remove the motor.

Figure 7



Item	Part No.	Description
1	325-0230	TORSION SPRING
2	633-2027	SPACER
3	414-2001	CABLE CHAIN
4	325-0281	SPROCKET, LARGE
5	805-3104	SCREW, BINDING HEAD 8-32 x1/4" (4 EACH)
6	325-0217	BRACKET, MOTOR MOUNT
7		CAPACITOR (PART OF ITEM 9 ACUTATOR MOTOR ASSEMBLY)
8	801-3108	SCREW, 8-32 x 1/2"
	840-3100	NUT, 8-32
	854-3100	LOCKWASHER, #8
9	325-9209	ACTUATOR MOTOR ASSEMBLY (WITH CAPACITOR AND SMALL SPROCKET)
10	829-3108	SCREW, PLASTITE #8 x 12" (5 EACH)
11	646-2002	POWER FILTER, 6 AMP
12	325-9201	VALVE ASSEMBLY
13	720-5005	RIBBED BUSHING (3 EACH)

5. To replace the actuator motor, position it on the bracket, install the four binding head screws, and reconnect the two terminals to the motor capacitor. Hold the bracket on the valve, and place the cable chain over both sprockets so that the splice in the chain is roughly ½ way between the sprockets. Reinstall two "plastite" screws in the outer two holes on the top of the bracket, and one screw on the tab below the motor.

6. After assembly, check the cable chain tension: it should be loose enough so that the two sides of the chain may be squeezed together roughly ½ way, but not touch. If adjustment is necessary, loosen the three screws holding the bracket, move the bracket for proper cable tension, and retighten the three screws. Alternately, the four screws holding the motor may be loosened and the motor moved.

7. Check that the valve assembly rotates freely without any binding to both extreme positions (with the Inhale Flow mechanism out of the way), and that the torsion spring always returns the mechanism to the middle position.

8. Replace the Power Filter using two "plastite" screws.

MOTOR BLOWER REPLACEMENT

The motor blower assembly may be removed and/or replaced without removing the Front Panel or Valve Assemblies. To remove the blower:

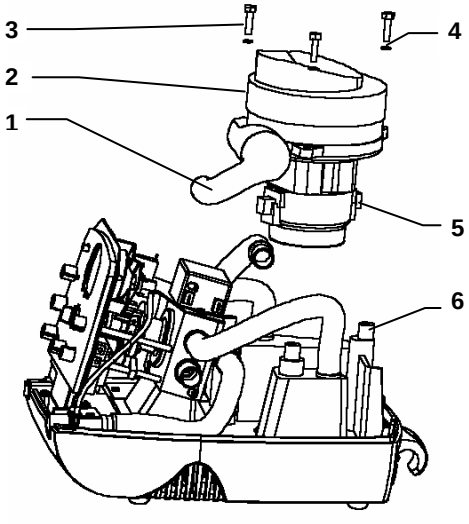
1. Remove the two flat head screws from the rear of the housing and the two pan head screws from under the front of the housing. See Figure 1.

2. Lift the Top Cover off of the housing.

3. Disconnect the 2-pin connector on the left side of the unit leading to the motor blower.

4. Slide the black plastic elbow off of the side of the valve assembly. See Figure 8. NOTE: The connector on the valve is fragile: be careful when removing the black plastic elbow not to exert too much side pressure. Also remove the hose connector from the large black cap on top of the blower.

Figure 8



Item	Part No.	Description
1	325-0282	DUCT, BLOWER EXHAUST
2	325-9205	MOTOR BLOWER ASSEMBLY
3	811-5110	SCREW, PAN HEAD, ¼ x 20-5/8" (3 EACH)
4	852-5100	LOCK WASHER, SPLIT #8 (3 EACH)
5	659-1002	MOTOR BRUSH (2 EACH)
6	745-1003	VIBRATION CONTROL MOUNT (3 EACH)

5. Unscrew the three large screws holding the blower housing to the vibration control mounts. Lift the motor blower assembly up and out of the housing.

6. To reinstall or replace the motor blower, reverse the steps above. NOTE: When reattaching the hose connector to the blower cap, BE SURE not to push the connector too far into the cap.

PROPER GROUND WIRE ASSEMBLY

The green wires with yellow striping inside of the CoughAssist are electrical ground leads and serve an important safety feature. There are two such wires attached to the bottom panel, and one attached to the front panel bracket. In order to meet IEC, UL and CSA electrical safety requirements for construction, these leads are attached to the device in a very specific sequence. If any of the leads are removed during servicing, they must be replaced in the proper order as follows:

Ground Lead to Front Panel Bracket

Reattach the front panel ground lead in the following sequence:

1. External tooth star lock washer, #8
2. Ring tongue from ground wire
3. Split lock washer, #8
4. Hex nut, #8
5. Tighten hex nut securely

Ground Leads to Bottom Panel

Normally these ground wires need not be removed for any servicing, except possibly to replace the bottom panel. If so, reattach the two ground wires to the bottom panel in the following sequence:

1. External tooth star lock washer, #8
2. Ring tongue on ground wire leading directly to the Power Entry Module
3. Split lock washer, #8
4. Hex nut, #8
5. Align ring tongue parallel to the tab on the bottom panel, towards the screw on the tab
6. Tighten the hex nut securely
7. Ring tongue on ground wire leading to the front panel
8. Split lock washer, #8
9. Hex nut, #8
10. Align ring tongue parallel to the tab on the bottom panel, towards the screw on the tab
11. Tighten the hex nut securely.

FINAL TEST PROCEDURE

After any disassembly of the CoughAssist, the unit should be tested for proper operation before being put back into service. This test can be done without the top cover on in order to gain access to the blower pressure adjustment potentiometers. See figure 9. However, proper precautions should be taken to avoid electrical shock if this is done.

TEST SET-UP

1. Use a rubber plug or similar object to temporarily block the Patient Connection on the front of the unit.

2. Check that the Pressure Gauge is zeroed. If adjustment is needed remove the gray dot covering the adjustment hole, adjust using a small flat blade screwdriver, and replace the dot.

3. On all models, set the Inhale Pressure knob fully clockwise, and Inhale Flow and Pressure knobs fully counterclockwise. On the CA models, set the Manual/Auto switch to Manual, and set each time knob to about 1 second.

4. Plug the CoughAssist into an appropriate electrical outlet.

FUNCTIONAL TESTS

1. Place the power switch to the “on” position and note that the green light in the switch comes on.

2. Turn the Pressure knob through the full range of blower speeds and be sure the speed of the motor increases steadily. With the Pressure knob fully clockwise, allow the unit to warm up for 1 to 2 minutes.

3. With the Pressure knob set at the minimum speed (counterclockwise) move the Manual Control Lever to the Inhale position (to the right) and note that the pressure on the gauge reads between 2 and 5 cmH_2O. Move the Manual Control Lever to exhale (to the left) and note that the gauge reads between -2 and -5 cmH_2O. Turn the Pressure knob to maximum (clockwise) and repeat inhale and exhale test noting that the reading on the gauge is between 57 and 63 cmH_2O. Release the manual control lever from the inhale and exhale positions at maximum pressure and note that the lever moves to the center and pressure drops immediately to 0 cmH_2O.

4. If the correct pressures are not achieved the pressure control can be adjusted as follows. First, remove the top cover. If the unit has not been on for a while, turn it on with the Pressure knob fully clockwise and allow the unit to warm up for 1 to 2 minutes.

WARNING: To avoid electrical shock, take the normal precautions when working with the unit plugged in and the cover off.

5. On the circuit board attached to the front panel locate the two trim potentiometers directly above the Patient Outlet on the right. See figure 9. The top trim pot adjusts the minimum pressure (clockwise to increase), while the bottom trim pot adjusts the maximum pressure (counterclockwise to increase). First adjust the minimum pressure (2 to 5 cmH_2O), then adjust the maximum (57 to 63 cmH_2O), then check the minimum again since the two adjustments interact somewhat. Repeat the adjustments a few times to be sure the minimum and maximum pressures, positive and negative, are correct.

6. Inhale Pressure Test - with the Manual Control Lever in the inhale position (to the right) adjust the pressure control knob to attain 40 cmH_2O. Set Inhale Pressure knob all the way counterclockwise. Note the reading on the gauge: it should be between 18 and 22 cmH_2O. Turning the inhale pressure knob slowly clockwise should increase the pressure gradually back to 40 cm H_2O.

7. Inhale Flow Check - turn the Pressure knob fully clockwise, actuate the Manual Control Lever to Inhale (to the right) and note the pressure reading on the gauge; release the control lever. Set Inhale Flow to minimum (clockwise). Actuate Manual Control Lever to Inhale and verify that the pressure reading has dropped less than 10 cmH_2O below the previous reading (maximum flow).

8. Remove rubber stopper from the patient outlet. Check the flow by actuating the Manual Control Lever to Inhale and note the flow of air out of the unit. Release the Manual Control Lever. Set Inhale Flow to maximum (counterclockwise), and repeat the test. Note that the flow out of the unit has increased markedly.

9. Automatic timing function test (CA models only) - Set the pressure to minimum. Move the switch from manual to automatic (Inhale, exhale and pause should already be set to 1 second). Verify that the unit immediately begins with the inhale pressure, followed by exhale (negative) pressure then drops to 0 cm H_2O and continues to repeat.

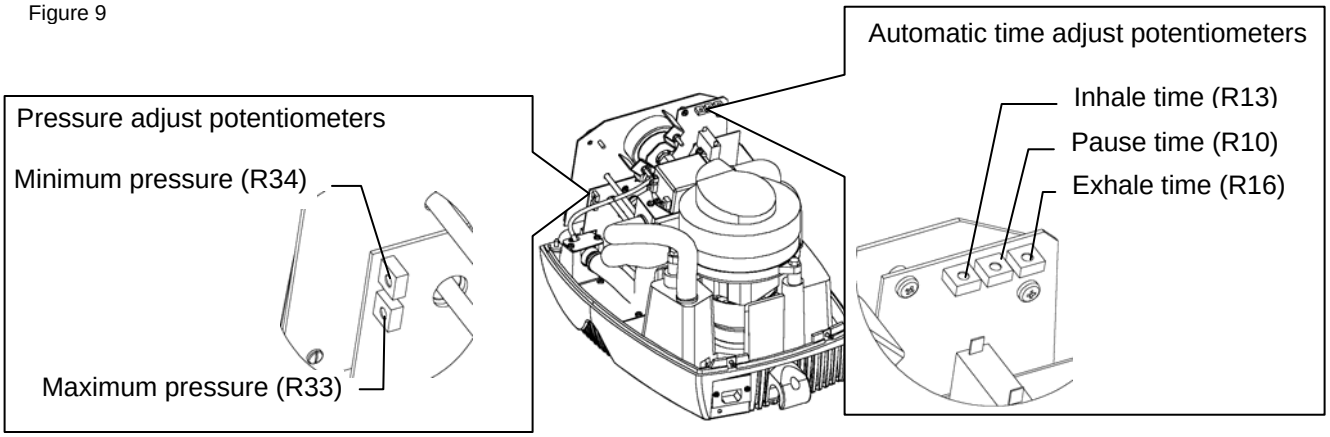
10. Set the switch back to manual and verify that the pressure drops to 0 cm H_2O. Return to Auto.

11. One at a time set each of the timing knobs to 5 seconds and verify that the each knob affects the correct phase, that is, inhale time varies the inhale pressure phase, exhale time varies the exhale pressure phase and pause time varies the zero pressure phase.

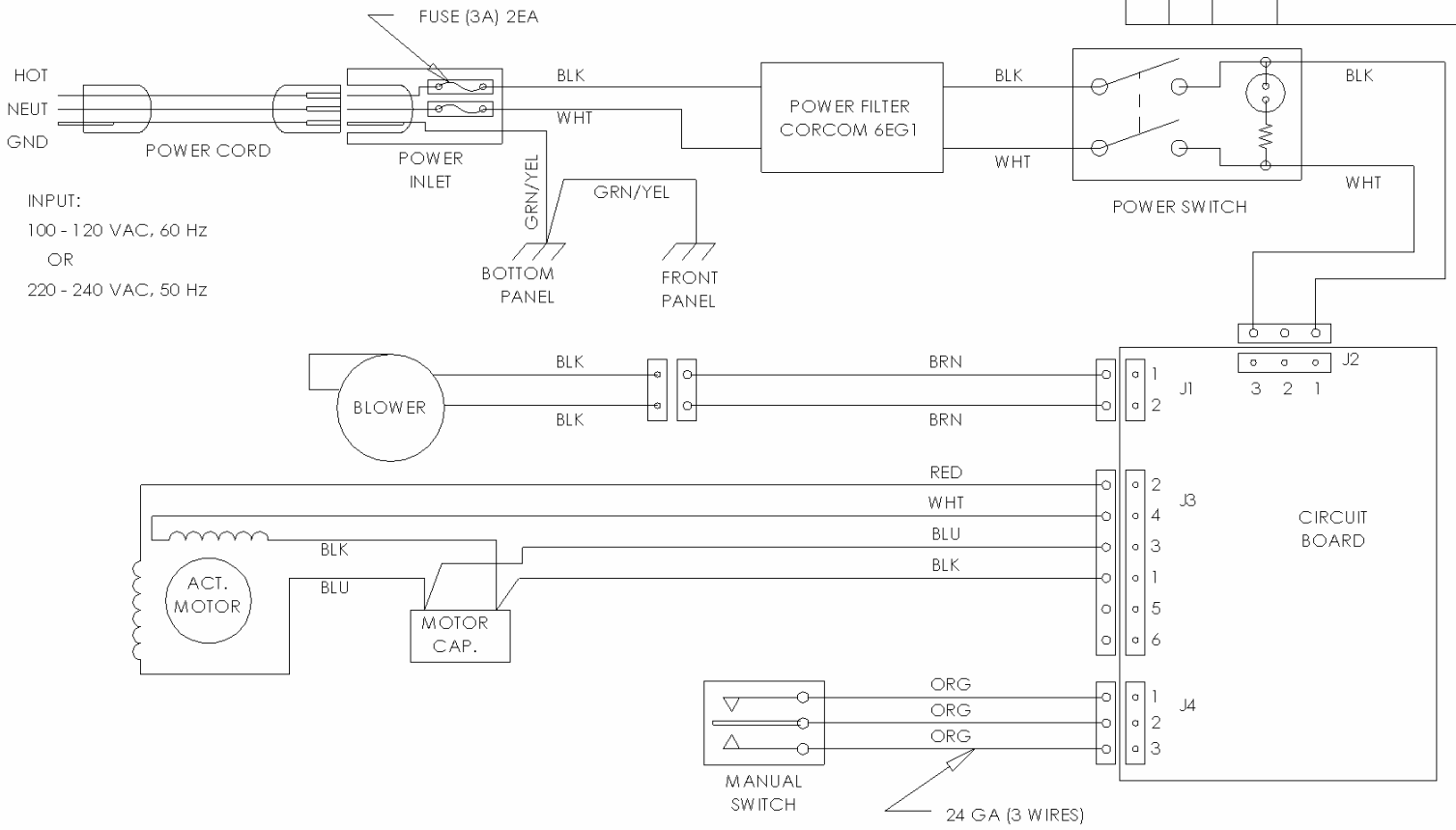
12. Timing check (CA models only) - Set the inhale, exhale and pause time knobs to 5 seconds. Using a stopwatch time each phase and verify that each one lasts between 4.8 and 5.2 seconds. Set the knobs to 1 second each and using a stop watch verify that each phase lasts between 0.9 and 1.1 seconds.

NOTE: These times are adjusted at the factory and usually do not need to be altered. However, if adjustment is required, this is controlled by the three trim potentiometers at the top of the circuit board, to the left of the Pressure Gauge, clockwise to increase the time. Left trim pot (R13) adjusts Inhale time. Middle trim pot (R10) adjusts Pause time. Right trim pot (R16) adjusts Exhale time. See figure 9.

Figure 9



NO	BY	DATE	CHANGE



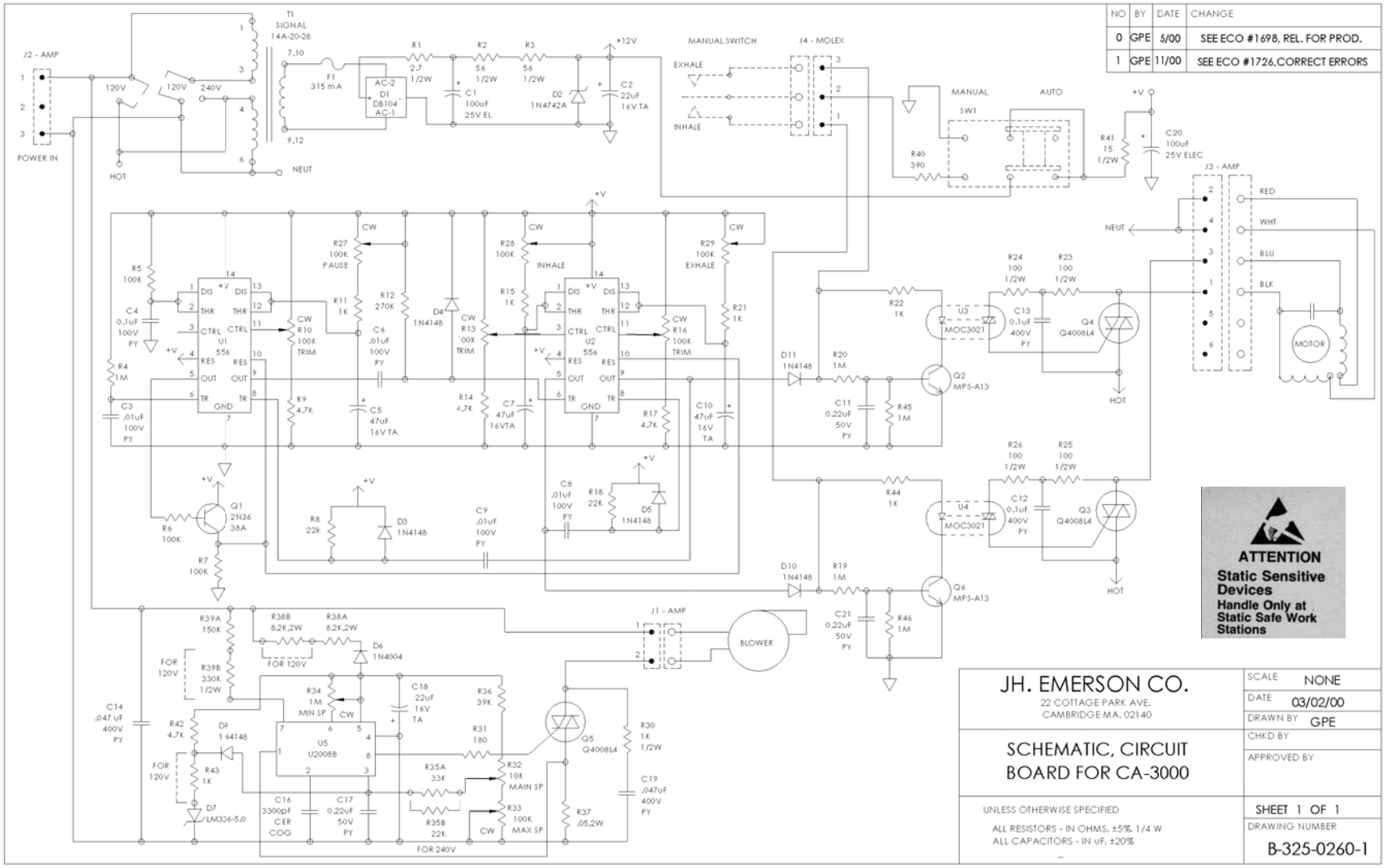
NOTE: UNLESS OTHERWISE SPECIFIED,
ALL WIRES 18 GA

JH. EMERSON CO.
22 COTTAGE PARK AVE.
CAMBRIDGE MA. 02140

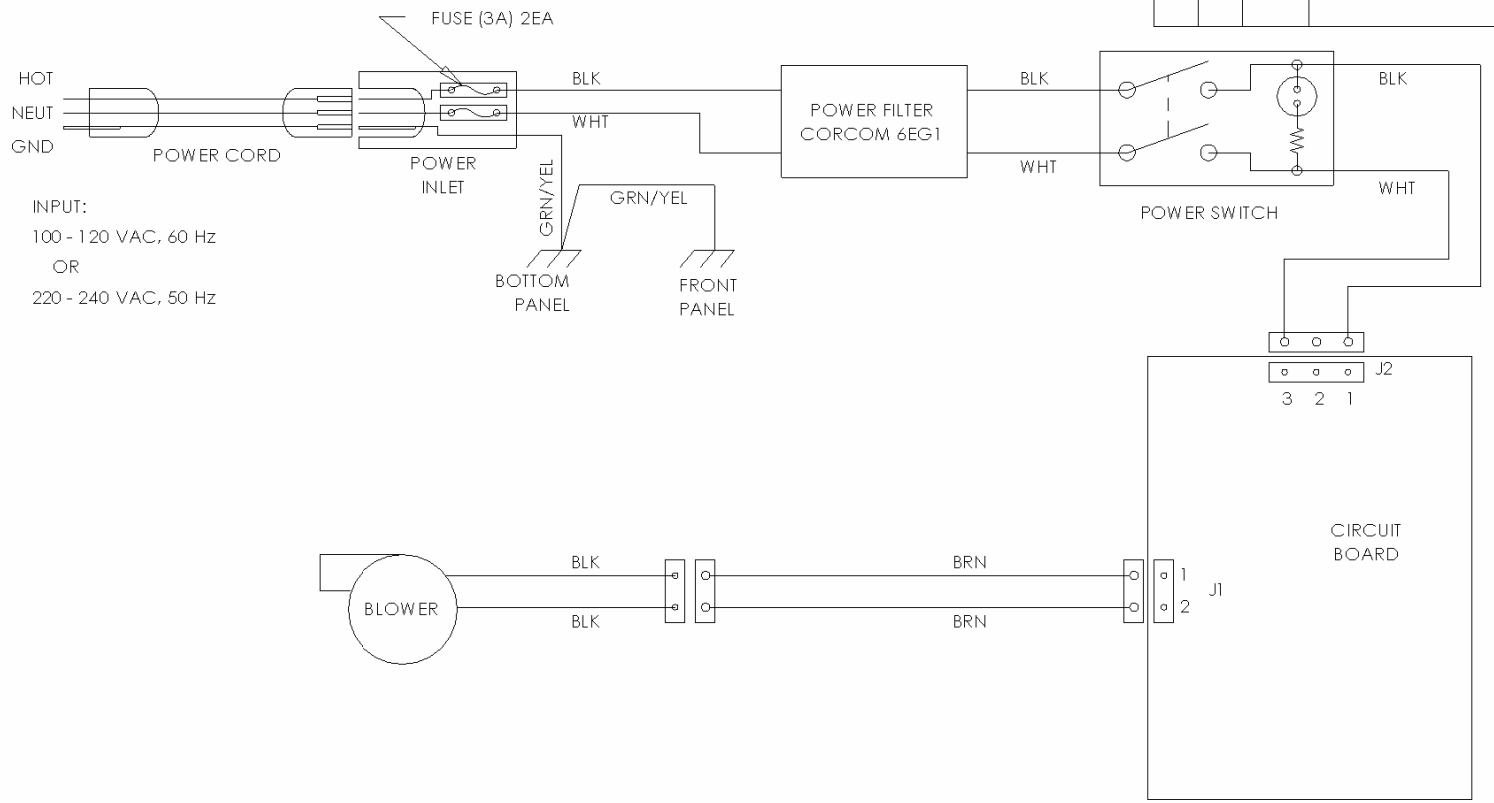
SCHEMATIC, FINAL
ASSY, CA-3000

TOLERANCE UNLESS OTHERWISE SPEC.
ALL DIM. ARE IN. - 2"
TOL = .X ± .2
.XX ± .02
.XXX ± .005
FRACTION = ± 1/64
ANGLE = ± 1

SCALE	NONE
DATE	03/03/00
DRAWN BY	GPE
CHKD BY	
APPROVED BY	
SHEET	OF 1 1
DRAWING NUMBER	A-325-0262-0


NO | BY | DATE | CHANGE
0 | GPE | 5/00 | SEE ECO #1698, REL. FOR PROD.
1 | GPE | 11/00 | SEE ECO #1726,CORRECT ERRORS
J2 - AMP
POWER IN
HOT
NEUT
T1
SIGNAL
14A-20-28
F1
315 mA
AC-2
D1
DB104
AC-1
MANUAL SWITCH
EXHALE
INHALE
J4 - MOLEX
MANUAL
AUTO
SW1
+12V
+V
C20
100uF
25V ELEC
J3 - AMP
RED
WHT
BLU
BLK
MOTOR
U1
556
U2
556
MOC3021
Q4
Q4008L4
Q2
MPS-A13
Q3
Q4008L4
Q6
MPS-A13
Q1
2N3638A
D3
1N4148
D4
1N4148
D5
1N4148
D6
1N4004
D7
LM336-5.0
D9
1N4148
D10
1N4148
D11
1N4148
U5
U2008B
Q5
Q4008L4
J1 - AMP
BLOWER
FOR 120V
FOR 240V
ATTENTION
Static Sensitive Devices
Handle Only at Static Safe Work Stations
JH. EMERSON CO.
22 COTTAGE PARK AVE.
CAMBRIDGE MA. 02140
SCHEMATIC, CIRCUIT BOARD FOR CA-3000
SCALE NONE
DATE 03/02/00
DRAWN BY GPE
CHKD BY
APPROVED BY
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS - IN OHMS, ±5%, 1/4 W
ALL CAPACITORS - IN uF, ±20%
SHEET 1 OF 1
DRAWING NUMBER
B-325-0260-1

NO	BY	DATE	CHANGE



NOTE: UNLESS OTHERWISE SPECIFIED,
ALL WIRES 18 GA

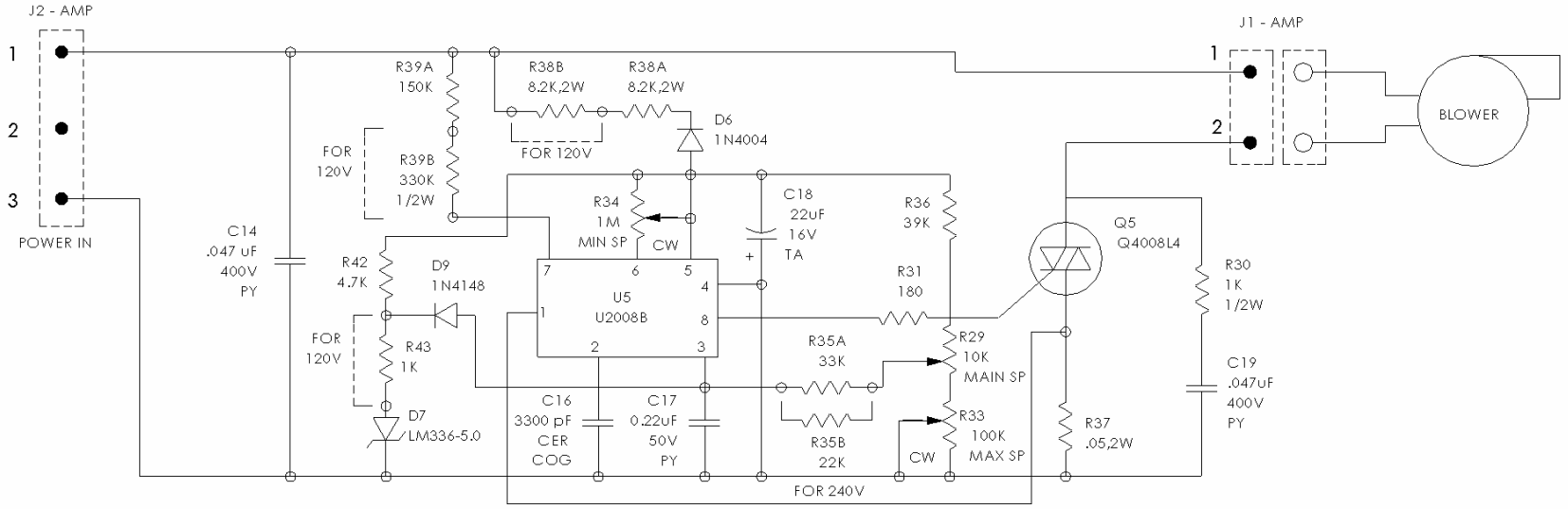
JH. EMERSON CO.
22 COTTAGE PARK AVE.
CAMBRIDGE MA. 02140

SCHEMATIC, FINAL
ASSY, CM-3000

TOLERANCE UNLESS OTHERWISE SPEC.
ALL DIM. ARE IN. - 2" FRACTION = ±1/64
TOL = .X ±.2 ANGLE = ±1
.XX ±.02
.XXX ±.005

SCALE	NONE
DATE	03/03/00
DRAWN BY	GPE
CHKD BY	
APPROVED BY	
SHEET	OF 1 1
DRAWING NUMBER	A-325-0263-0

NO	BY	DATE	CHANGE
0	GPE	5/00	SEE ECO #1698, REL. FOR PROD.
1	GPE	11/00	SEE ECO #1726, CORRECT ERRORS



ATTENTION
Static Sensitive Devices
Handle Only at Static Safe Work Stations

JH. EMERSON CO. 22 COTTAGE PARK AVE. CAMBRIDGE MA. 02140	SCALE NONE DATE 03/03/00 DRAWN BY GPE
SCHEMATIC, CIRCUIT BOARD, CM	CHKD BY APPROVED BY
UNLESS OTHERWISE SPECIFIED ALL RESISTORS - IN OHMS, ±5%, 1/4 W ALL CAPACITORS - IN uF, ±10%	SHEET 1 OF 1 DRAWING NUMBER A-325-0261-1

J.H. Emerson Co.
22 Cottage Park Avenue
Cambridge, MA USA 02140-1601
Phone: 800-252-1414 or 617-864-1414
Fax: 617-868-0841
Email: info@jhemerson.com
Web: www.coughassist.com